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STATUS OF ELECTRIFICATION IN RUMANIA AND PLANS FOR FURTHER EXPANSION

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Unsigned Article

(Report on the power economy of Rumania, with a map sketch)

Before the war the power supply of Rumania was extraordinarily deficient. In 1938 there were power stations with a total equipped output of 510,500 kw, producing altogether 1.148 million kwh of electric power. At present, after the end of the war, the equipped output increased to 770,000 kwh, of which only 600,000 kwh were used. The power produced was delivered by 603 plants -- for the most part by the small and the smallest -- which were scarcely connected with each other. Of the 510,500-kw equipped output (1938), 262,500 kw served public needs, and 248,000 kw industrial enterprises. With respect to the power produced, 568 million kwh was consumed in public power networks, and industry consumed the greater half of the total power produced, 580 million kwh. In 1938 the annual production of power corresponded to an amount of 63.7 kwh per person per year; after the end of the war it increased to about 70 kwh per person per year. At this time the power consumption per person per year in Poland was 110 kwh; in Hungary 160 kwh; in Czechoslovakia 285 kwh; and in Germany 793 kwh.

The regional distribution of plants or of power production was also completely irregular. Thus, the density of equipped output amounted to 0.47 kw/km^2 in Little Walachia (Oltenia), 0.78 kw in Dobruja, 3.5 kw in Transylvania, and 6.8 kw/km^2 in Greater Walachia (Muntenia; influenced by Bucharest). Power per person per year in these regions was 7 kw in Oltenia, 60 kw in Muntenia, and 78 kw in Transylvania. The percentile gradation of that part of the population of Rumania provided with power also corresponded to these regionally quite diverse developmental gradations. Thus, in the entire country this accounted for 24.5% of the population. On the other hand, the amount was 28.2% in Banat, 27.9% in Transylvania, and 30.6% in the Crisana-Maramures region. In the old Rumanian parts of the country the percentage was smaller, viz., 23.8% in Moldavia, 19.8% in Dobruja, and 16.1% in Oltenia. Only in Muntenia was the percentage higher (29.7%), due to the fact that Bucharest supplied 69.8% of its population with power. The percentage was lowest in Bessarabia where only 14.9% of the population was supplied with power. Only 11% of all the municipalities of Rumania were supplied with electric power; four-fifths of the population made up of rural inhabitants accounted for scarcely 8% of power consumption. However,

even the medium and smaller cities were insufficiently supplied. Whereas in 1938 in Rumania the power consumption amounted to 256 kwh per person; the corresponding amount in the cities of Transylvania and Banat was somewhat lower. In Czernowitz, Galatz, and Braila the corresponding amount was about 150 kwh; in Craiova and Constanta somewhat over 80 kwh; in Ploesti, local oil industries notwithstanding, only 48 kwh.

Most of the plants operating for public requirements were the small and smallest enterprises: of 224 plants (the remaining ca. 400 were operated for industrial needs), 172 had only a one- to 500-kw equipped output, 40 had an output between 500 and 5,000 kw, and only 9 had an output up to 10,000 kw, and 3 an output over 10,000 kw. Of the 568 million kw-hrs per year production of these plants, 324 + 117 = 441 million was produced by the last 2 groups, i.e., by 12 plants. The remaining 212 produced altogether only 127 million kwh. Finally, the raw-material consumption of those power plants existing in 1938 was to a high degree uneconomical, since to a preponderant extent they consumed high-grade fuels. Of the 262,500-kw equipped output which served the public power requirement (see above), only 30,000 kw -- about 12% -- fell to the share of hydraulic power stations. The entire remaining share went to thermal power plants, whereby petroleum and natural-gas heating predominated. For the period directly before the establishment of the electrification plan at the end of 1950, there was the following distribution in respect to power sources for the production of electricity:

Plants with natural gas as power source	40.3% of production
Plants with petroleum as power source	29.8% of production
Plants with other fuel bases	2.1% of production
Plants on a basis of high-grade coal	6.1% of production
Plants on a brown-coal basis	13.7% of production
Hydroelectric generating stations	8.0% of production.

This survey applies to all plants: those serving the public electricity requirement, as well as those operating for industrial enterprises. Represented in such a state of quite unsatisfactory production of electrical power in Rumania are not only the abundantly high-quality energy sources of petroleum and coal, but also above all the quite extensively unutilized water power. Potentially developable water power is estimated at approximately 5 1/2 to 6 million kw, of which up until the war only about 50,000 kw were produced. In the presence of a full development, hydraulic power could produce a yearly amount of electricity of approximately 27 billion kwh, i.e., about 25-fold the total production of 1938.

In the face of this retrogression, as well as in respect to the rapidly growing power requirement caused by the enforced industrialization, in Rumania on 26 October 1950 a 10-year plan for electrification was established. The essential points of this program plan were the following: All electrical plants in existence up to this period were consolidated, the country was divided into 7 power districts, and through the commencement of a compound system which manifested a modest starting development, an increased exploitation of already existing plants and the inclusion of new participants in the power network were attained. The division into 7 districts will simultaneously be maintained for the further development of power plants as an organizational basis (regional breakdown as follows: (1) Muntenia, (2) Oltenia, (3) northern Moldavia, (4) Southern Moldavia, (5) middle Transylvania, (6) northwest Transylvania, (7) Southwest Transylvania). In addition

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to existing plants, a great number of new plants are to be constructed, and other existing plants are to be developed to a considerable extent. Altogether, 13 hydroelectric generating stations with an equipped output of 1,039,000 kw, 5 extensions to existing thermal power plants with an additional 59,000 kw, thermal power plants in industrial enterprises with 98,000 kw, 24 larger and medium thermal power plants as new plants with 764,000 kw, and small power plants with 40,000 kw for regional requirements are to be constructed. Of the large and medium planned works, 1,196,000-kw equipped output (or 59.2%) fall to the share of hydroelectric generating stations; 764,000 kw (or 38.2%) to thermal power plants; and the remainder to small power plants and industrial plants. The development of this construction plan is foreseen in two steps which coincide with the 2 five-year plans, so that the first development stage will be completed in 1955 and the second at the end of 1960.

The development of the power plants in the extent forseen will realize an increase of equipped output to approximately a fourfold extent in contrast to 1950, and production to an approximate three-and-one-half-fold extent in relation to 1950. At the same time, along with the new construction of the planned plants, a compound network is likewise to be developed in two stages and is to consist of a ring-shaped 220-kv system which will encompass northern Moldavia, inner Transylvania, Muntenia, and Oltenia; while a second 220-kv system will encompass southern Transylvania. The remaining regions will be incorporated by means of 110-kv conduits or included in these 2 main networks. Relating to the conditions of existing, as well as of plants and compound conduits foreseen in the course of the electrification plan, is the appended map sketch which is taken from Scanteia of 26 October 1941 and has been correspondingly simplified. Here, it is a question of a commemorative article in regard to the first anniversary of the passage of the electrification plan. The following table relates to the effects of the plan in general, as well as to the displacements which it effects within the power production of Rumania and in regard to power provision of the country.

Results	1950	1955 (planned)	1960 (planned)
Equipped power in megawatts (= 1,000 kw)	740	1,700	2,600
Available power in megawatts	600	1,660	2,500
Thereof from:			
Thermal power plants	550	1,370	1,765
Hydroelectric generating stations	50	290	735
Percentage of thermal power plants	92 %	82.5 %	70.6 %
Percentage of hydroelectric generating stations	8 %	17.5 %	29.4 %
Power production per km^2 in kwh	2.53	7.0 %	10.6 %
Power production per person in kwh	37.5	105.0	150.0

The figure goals mentioned at the end of the table for power density evidently relate only to power destined for public consumption, exclusive of power for industry (cf. the introductory data for 1938 which have as a basis the total power production). Thus, the plan foresees that the hitherto existent more than 90% preponderance of thermal power stations will be displaced to a relationship of 2/3 to 1/3 between thermal and hydroelectric power stations. However, within the thermal power plants to be presently constructed, the use of lower-quality brown coal, as well as of by-products of petroleum and natural-gas production, is planned. The use of high-quality fuels for power production is to be excluded. The plan also contains exact data for the distribution of the electricity produced. The following table shows the corresponding planning for 1960.

Purpose	1950 (in millions of kwh)	1960 (plan)
Mining and industry	1.310	4.330
Electric railroads	2	330
Communal requirements	190	520
thereof: street lighting	70	200
tramways and trolleybuses	80	200
waterworks	40	120
Household and office requirements	220	750
Consumption in rural areas	20	230
Losses and self-requirements of centrals	358	870
Power consumption in toto	2.100	7.000

The sharpest increase is to be experienced by power consumption in rural areas. According to the plan, the number of electrified villages (450 in the year 1941) will be increased to a total of 2,000 (i.e., in relation to a total number of villages in Rumania of ca. 13,000, this still represents only a sixth). Further, the power consumption for electric railways shall strongly rise. Planned is an electrification of the route from Kronstadt via the Predeal Pass to Ploesti and Bucharest. The increase factor of the power foreseen for industry and for communal and household requirements is held approximately in balance, and on the average amounts to a 3-fold increase in contrast to 1950.

Information on the progress of the electrification plan is incomplete. From the four-year or yearly plan-fulfillment reports only incomplete conclusions can be drawn in regard to the status of realization. Of greater interest is the abundance of individual reports which are available in regard to the completion or the progress of construction of the various larger plants. In general, however, it can be established that the originally foreseen tempo of electrification can not be maintained. On the progress of installed output capacity no individual data are available; nevertheless, 740,000 kw is known to be the output for 1950. The plan-fulfillment report of 1954 mentions 113,800 kw, and in his commemorative speech in relation to the eleventh anniversary of the liberation of Rumania (23 August 1955) Gheorghiu-Dej reported that the equipped output increased nearly 75%, i.e., not quite 1,300,000 kw; whereas the planned goal for 1955 foresaw 1,700,000 kw. It is of course out of the question that the remaining 400,000 kw can be attained by the end of the year. It is an analogous matter in the case of power production itself. In 1938 production encompassed 1.148 million kwh, falling to 700 million kwh in 1946, reattaining 1.511 million kwh up to 1948, and attaining 2.1 million kwh in the terminal year before the assumption of the electrification plan. In the speech mentioned, Gheorghiu-Dej reported an increase of more than 2-fold in relation to 1950 (i.e., +4.2 million kwh), or 3/8 more than in relation to 1938 (i.e., 4.362 million kwh). This increase would not be quite half the total increase

which the electrification plan foresees for the period up to 1960. Therefore, in relation to the development of equipped output, a plan fulfillment of about 2/3 up to the end of 1955 can be reckoned; whereas power production itself approaches still more the goal, without attaining it, however.

The first larger completed plants assumed operations in 1952. These were the Ovidiu II thermal power plants located just west of Constanta and constructed mainly for work on the Danube-Black Sea Canal (cf. Wissenschaftlicher Dienst Suedosteuropa, No 2, 1954, pages 29 ff.); and the Doicesti, which uses a basis of brown coal, situated near Ploesti and intended mainly for the provision of the there-located petroleum enterprises and those of Bucharest. This latter plant was named in honor of Gheorghiu-Dej. Simultaneously with the construction of these first 2 large plants, work began on the largest of the planned power plants, to be named in honor of Lenin. In this case it is a question of a hydroelectric generating station located in northern Moldavia in the valley of the Bistrita, a tributary of the Sereth. The earth dam currently under construction near Isvorul-Muntelui will dam up a reservoir containing one billion m^3 of water, thereby rendering possible an equipped output of 210,000 kw, and assuring a yearly production of 430 million kwh. The completion of this work which is still in process of construction will have a lasting effect on the power situation of Rumania. An accompanying fructification of this project will be the possibility of the irrigation of 300,000 ha of land in middle Moldavia and the northern Baragan steppe, as well as the rendering navigable of the Sereth from Galatz to Bacau, where the Bistrita discharges. A smaller waterworks with about 16,000 kw output was put into operation in Moroeni in the Ialomita Valley on the southern edge of the Carpathians. An equally large hydroelectric generating plant is nearing completion in Sadu, south of Sibiu. Under construction besides these plants are larger thermal power plants in Filipesti north of Bucharest, in Petrosani in the coal region, in San Georgiu in the Szekler region, and in Borzesti in middle Moldavia. The largest of these plants will be that in Petrosani with a capacity of 150,000 kw. Presumably, this plant will thereby become the second largest power plant in Rumania, next to the Lenin plant on the Bistrita. Additional great projects in regard to thermal power plants at Craiova (Almajiu) near Valisoara and in the inner Szekler region, as well as numerous medium and smaller hydroelectric generating plants will be commenced in the second part of the planned project. Great attention is turned to the development of the projected compound network, in addition to the development of power plants. The total encompassment of this network will amount to nearly 4,000 km in the final stage. Individual reports on the latest stage of development are not available. The plan-fulfillment report for 1950 mentioned the new construction of a 370-km compound conduit. If this construction is maintained as the yearly average, the planned goal can be approximately attained by 1960.

In connection with the progressing electrification of Rumania a development of the electrical industry was also necessary, in order to produce in the native country a part of the power-plant equipments and installations of transformer substations, as well as the electrical appliances and machines required to an increased extent. However, the equipments for the first large plants came from abroad, viz., from the USSR, and, for example, those for the Doicesti power plant, from Czechoslovakia. At the present time the Rumanian electrical industry endeavors to step-by-step fully cover her self-requirements in machines and commodities. Simultaneously, much is being done for the popularization of electricity consumption, especially in rural areas. It has been reckoned that through the development of electrification in agriculture 50 million workdays can be saved annually. In any case, it is seen that the establishment of the electrification plan has lastingly influenced the economic and social structure of Rumania, that it

will continue to influence it, and therefore is deserving of continuous attention.

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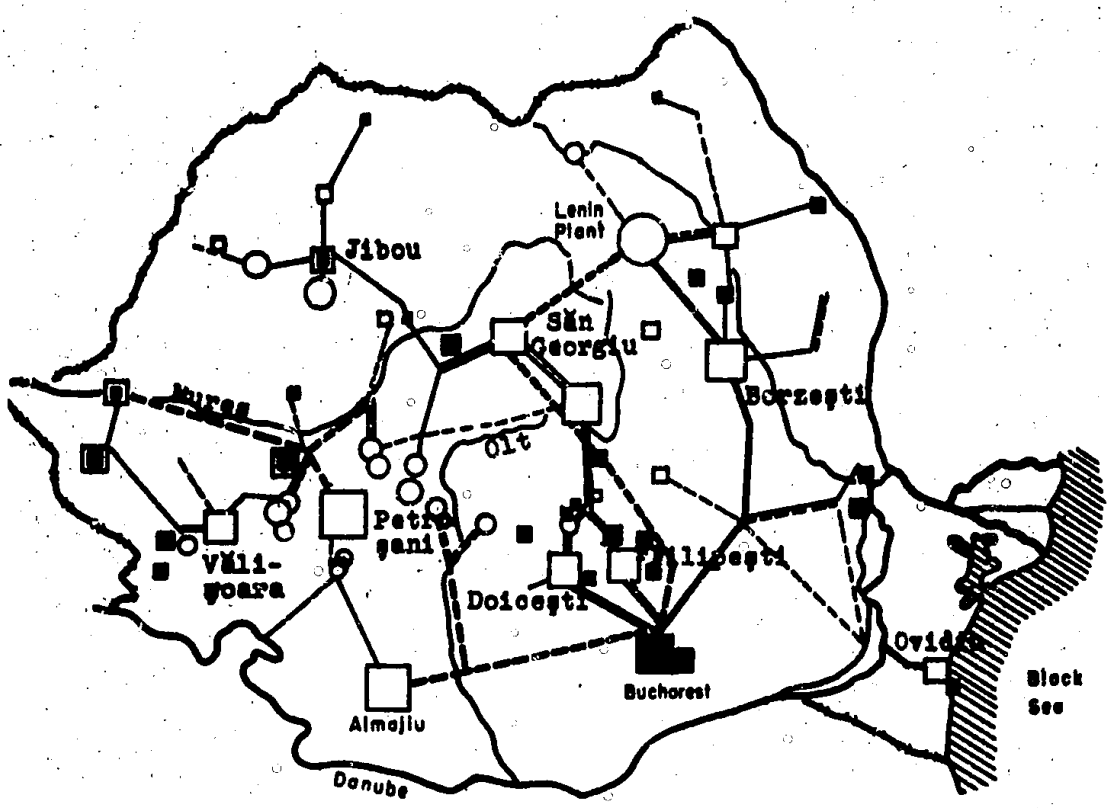
POWER PLANTS IN RUMANIA : EXISTING, UNDER CONSTRUCTION, PLANNED



1 : 4,000.000

0 100 200 km

LEGEND

- Existing thermal power plants
- Thermal power plants under construction or destined for construction
- Thermal power plants under construction or planned
- Hydroelectric generating plants under construction or planned
- Compound conduits (220 kv) to be built during the First 5-year Plan
- Compound conduits (220 kv) to be built by 1960
- Similar compound conduits (110 kv)
- Size of block indicates equipment output in kw

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